ANOTAÇÕES REF : Computation of the Transient in Max-PlusLinear Systems via SMT-Solving

A ideia de grafo precedente aparece em ambos os artigos que eu li. No primeiro que se trata especificamente de DEDS e o outro que trata de MPL (Max-Plux Linear System). No segundo aparece definido da seguinte forma:

Definition 1 (Precedence Graph [3]). The precedence graph of $A \in \mathbb{R}_{\max}^{n\times n}$, denoted by $\mathcal{G}(A)$, is a weighted directed graph with nodes $1, \ldots, n$ and an edge from j to i with weight $A(i,j)$ for each $A(i,j) \neq \varepsilon$. □

Definition 2 (Regular Matrix [13]). A matrix $A \in \mathbb{R}_{\max}^{n\times n}$ is called *regular* if A contains at least one finite element in each row. □

Definition 3 (Irreducible Matrix [3]). A matrix $A \in \mathbb{R}_{\max}^{n\times n}$ is called *irreducible* if $\mathcal{G}(A)$ is strongly connected. □

Além disso, aparece-se a mesma definição para um sistema dinâmico linear:

A dynamical system over the max-plus algebra is called a Max-Plus Linear (MPL) system and is defined as

$$\mathbf{x}(k+1) = A \otimes \mathbf{x}(k), \quad k = 0, 1, \ldots \tag{2}$$

Onde x é o *Vetor Estado* que armazena o estado atual de cada evento – no nosso caso armazena o horário de saída de cada trêm, uma vez que nosso evento discreto é a saída de trens.

Transient:

Definition 6. Suppose we have a regular matrix $A \in \mathbb{R}_{\max}^{n\times n}$. The underlying MPL system (2) is classified into three categories as follows:

i. *never periodic*: $\mathsf{tr}(A, \mathbf{x}(0))$ does not exist for all $\mathbf{x}(0) \in \mathbb{R}^n$,
ii. *boundedly periodic*: $\mathsf{tr}(A, \mathbf{x}(0))$ exists for all $\mathbf{x}(0) \in \mathbb{R}^n$ and $\mathsf{tr}(A)$ exists,
iii. *unboundedly periodic*: $\mathsf{tr}(A, \mathbf{x}(0))$ exists for all $\mathbf{x}(0) \in \mathbb{R}^n$ but $\mathsf{tr}(A)$ does not.

We call (2) *periodic* if it is either *unboundedly periodic* or *boundedly periodic*. □